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ABSTRACT

The relationship between musical aptitude and musical environment in sixth-grade students is studied. Forty-one students from a suburban middle school were administered a 21-item Music Environment questionnaire which determined whether they or their family played a musical instrument, attended symphony, country-western, and/or rock concerts, had an organ or piano in the home, or played in a school performance group. Students were also administered the Musical Aptitude Profile (MAP) which analyzed their aptitude in tonal imagery, rhythmic imagery, and musical sensitivity. Results indicated that one environmental factor, playing an instrument, significantly correlated with rhythmic imagery. Two environmental factors proved to be valid discriminators between the high- and low-scoring subjects: the high music aptitude students were more likely to have played a musical instrument and attended fewer rock concerts than the low aptitude students. However, none of the other environmental factors were significantly related to MAP scores. These results point to the difficulty that parents and educators have in influencing a sixth-grader's musical aptitude (as opposed to musical skills, achievement, and interest) and to the importance of music in the child's early life. (KC)

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RELATIONSHIP BETWEEN MUSICAL ENVIRONMENT AND MUSICAL APTITUDE

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Individuals differ in their musical aptitude. Music teachers and researchers frequently wonder what factors differentiate the variety of levels of musical aptitude within a group. What is the role of heredity, personality traits, socio-economic levels, maturational levels, or environmental influences on musical aptitude? This study examines one aspect of this question: the relationship between musical aptitude and musical environment.

The relationship between a child's musical aptitude and musical environment is basic to both the understanding of the musical development of children and music aptitude measures. There is a need for studies which examine the relationship between musical aptitude and musical environment. For example, after reporting data on the factors which may affect musical aptitude, Gordon states that, "These relationships will be more critically examined in future controlled research (1,22)." More recently, Radocy and Boyle found that there are grossly insufficient data relative to the musical development of children (9,267).

Most studies investigating the relationship between musical environment and musical development involve young children ranging in age from two to five years. For example, Reynolds indicated a direct relationship between accurate singing in kindergarten students and the singing and piano playing of the mother in the home, availability of children's records, and a home atmosphere encouraging musical expression (10). Some of Reynold's work has been confirmed by Shelton who attempted to determine what factors in the preschool home musical environment influenced the musical response of first-grade children (11). Musical response was partly defined as ability to sing in-tune, discriminate pitches, respond to rhythms through bodily movement and play rhythm instruments. The following environmental factors revealed a high relationship with greater musical response: frequent opportunities for the child to hear singing and records, and the ability of the mother and father to sing and to learn new

songs. Factors revealing a low relationship with musical response were: presence of a piano in the home, study of applied music by parents, and parental concert attendance.

A more recent study by Jenkins found that the musical home environment has a strong relationship to the musical development of the young child(5). This influence begins prior to age two and continues during the third year. The relationship between singing ability of pre-kindergarten children and their musical environment was also investigated by Kirkpatrick (1962). Musical environments that were highly rated seemed to "produce" accurate singing among the pre-kindergarten child. Of lesser influence were older siblings, nursery and Sunday school attendance.

Previous research examined the relationship between musical environments and musical development among pre-school children. Gordon, on the other hand, is one of the few researchers to investigate these relationships among elementary-and secondary-age students(1). Using his Musical Aptitude Profile (MAP) as the measure of musical aptitude, Gordon has found "such environmental factors bear a low, but in some cases, a significant association with musical aptitude scores (2,44)." It is important to note that measures of aptitude theoretically should not be affected by environmental influences associated with formal schooling or training (9).

When Gordon investigated the correlations between twenty-three "environmental factors" and scores on the MAP, only seven environmental factors were found to be statistically significant when correlated with all three sections (e.g., Tonal Imagery, Rhythmic Imagery, and Musical Sensitivity) of the Musical Aptitude Profile* (2).

These statistically significant environmental factors included whether the student: (a) "liked" to practice; (b) played an instrument in an extra-

*It should be noted that 17 of these 23 "environment factors" were found to be statistically significant when correlated with all the sub-scores of a music achievement test.

school activity; (c) took summer music lessons; (d) played a second instrument; (e) had a piano at home; (f) attended concerts. The other significant factor was occupational status of the head of the household.

Most of the studies which investigated the relationship between musical aptitude and musical environment involved pre-school aged children. The present study, however, differs in that subjects were older, approximately 11 years old and in the 6th grade. Gordon did include subjects from grades four through twelve, however, his studies, were conducted nearly seventeen years ago (1). While up-dating and relicating Gordon's (1), (2) work, this study also examined additional environmental conditions which have not been previously investigated.

Purposes and Procedures

The two purposes of this study were to (a) determine if there is a relationship between musical environment and musical aptitude, and (b) determine an estimate of the validity of environmental factors in differentiating between six-grade children with high or low scores on a standardized music aptitude test. For the purposes of this study, "musical environment" was defined as any in- or out-of-school musical experiences which were listed on the Music Environment Questionnaire (MEQ) (See Figure 1). The experiment involved forty-one sixth-grade students ($\underline{M}$ age = 11.2 years) who were selected from a suburban middle school located near a large southwestern city.

Figure 1

Items on the Music Environment Questionnaire

Played a musical instrument
Length of playing experience
Number of instruments family owns
Family members who play an instrument
Piano in the home
Family members who play piano
Organ in the home
Family members who play organ
Number of records owned
Symphony concert attendance?
Number of symphony concerts attended
Rock concert attendance?
Number of country & western concerts attended
Opera attendance?
Number of operas attended
Parents attend symphony concert?
Number of symphony concerts parents attend
Sung or played in church or temple choir
Sung or played in school performing group

Each subject was administered an experimenter-designed Music Environment Questionnaire (MEQ). This instrument, which contained 21 items, ascertained the subjects' musical environment. Items included on the MEQ are shown in figure 1. Gordon's "Interview Questionnaire Employed to Obtain Information Pertaining to Environmental Factors" influenced the selection of items on the MEQ (2,45). Other items on the MEQ were included because they had been omitted by other researchers who have studied the relationship between musical environment and musical aptitude. Subjects were also administered all three parts of the MAP (1).

First, the data generated from the MEQ were subjected to a frequency analysis in order to obtain an overview of the subjects' musical environment. Second, the responses of the subjects on the 21 item MEQ were Alpha Factor Analyzed (8). This procedure was important in order to identify underlying dimensions (significant factors) of musical environment. Based on the alpha factor analysis, seven aspects of musical environment were identified as sig-

nificant factors (See Table 2). Finally, a Pearson Product Moment Correlation determined if there were any statistically significant relationships between these certain underlying dimensions of musical environment and scores on the MAP.

To fulfill the second purpose of the study, a two-group discriminant analysis was performed in order to determine the validity estimate of the seven music environmental factors in differentiating between children with high or low scores on a standardized music aptitude test. Consequently, the subjects were categorized as having high music aptitude (n = 23) if their composite MAP scores were 48 or higher or categorized as having low music aptitude (n = 18) if their composite MAP socres were 47 or lower.

Results

Based on a frequency analysis of the data generated by the MEQ, 54 percent of the subjects said they had played a musical instrument; half of these students had played their instruments for more than one year. Forty-nine percent of the subjects had a piano in their homes, while only 20 percent said their family owned an organ. Slightly over half of the subjects (54 percent) owned more than 100 tapes or records. Eighty percent of the students had attended at least one symphony concert, while only 20 percent had attended a rock concert. Twenty percent had attended at least one country and western concert. At least one opera performance was attended by 60 percent of the subjects. Slightly over half of the students' parents had attended at least one symphony concert. Of these, 17 percent attended four or more per year. Forty-two percent had sung or played in a church or temple choir, while 85 percent said they had sung or played in a school group.

Table 1 shows the means, standard deviations and range for the subjects on the MAP. Based on the Alpha Factor Analysis, seven significant factors

were identified (See Table 2). These significant factors of music environment were (a) whether or not a student played a musical instrument, (b) had ever attended a symphony concert, (c) number of rock concerts attended, (d) number of individuals in the family who played the organ, (e) number of country and western concerts attended, (f) number of symphony concerts the subjects' parents attended, and (g) whether or not the subjects sung or played in a school performing group. These seven significant musical environmental factors were correlated with each of the "sub-scores" of the MAP. As shown in Table 3, none of the musical environmental factors is significantly related to tonal imagery scores or to musical sensitivity scores. When the musical environmental factors were correlated with the rhythmic scores, one out of the seven factors (whether the subject-played an instrument) showed statistical significance.

Except for the one statistically significant correlation between playing an instrument and the score on the rhythmic imagery "sub-test" of the MAP, the data do not support the hypothesis that there is a relationship between the other musical environmental factors and musical aptitude.

Table 1

Means, Standard Deviations and Range

on the MAP

(N = 41)

Variables	M	SD	Range
Tonal Imagery	51.83	9.38	35-73
Rhythmic Imagery	59.83	10.18	38-76
Musical Sensitivity	36.93	9.04	12-55
Composite Score	49.07	7.80	32-62

Table 2

Factors of Musical Environment Based

on Rotated Factor Analysis

($\underline{N}$ = 41)

Factor	Factor Weights
Played a musical instrument	.96
Sung/played in a school performing group	.69
Attended a symphony concert	.96
Number of rock concerts attended	.99
Number of family members who play the organ	.82
Number of country and western concerts attended	.98
Number of symphony concerts subjects' parents attended	.84

Table 3

Pearson Product Moment Correlation Between Musical

Environmental Factors and Scores on the MAP

($\underline{N}$ = 41)

	Criteria Measures		
Predictor Variables	Tonal Imagery	Rhymthmic Imagery	Musical Sensitivity
Played an instrument	.27	.43*	.29
Symphony concert attendance	.19	.10	.07
Number of rock concerts attended	-.01	-.21	-.27
Number in family who play organ	-.01	-.21	.03
Number of country and western concerts attended	.07	-.14	.04
Number of symphony concerts parents attended	.05	-.12	.24
Sung/played in school performing group	.05	-.12	-.03

To determine which of the seven musical environmental factors accounted for the greatest amount of variance between the subjects who score high or low on the MAP, univariate F values were computed in addition to the discriminate analysis. The means and standard deviations of these subjects on the seven musical environmental factors are shown in Table 4. The two-group discriminant analyses involving the seven musical environmental factors yielded a canonical correlation of .49 ($p < .01$) corresponding to a chi-square of 10.24 ($df = 2$). Thus, there is a statistically significant difference between the high-and low-music-aptitude subjects based on their composite scores on the MAP. Data from these analyses are shown in Table 5.

Table 4

Means and Standard Deviations of

High and Low Aptitude Children on

Music Environmental Factors

Musical Environmental Factors	High (n = 23) M	SD	Low (n = 18) M	SD
Played an instrument	.70	.47	.33	.48
Symphony concert attendance	.83	.39	.72	.46
Number of rock concerts attended	.04	.14	.19	.30
Number in family who play organ	.35	.88	.28	.75
Number of country and western concerts attended	.19	.36	.22	.35
Number of symphony concerts parents attended	.33	.32	.39	.44
Sung/played in school performing group	.83	.39	.89	.32

Table 5

Univariate F Values and Standardized Discrimination Weights of Musical Environmental Factors

Musical Environmental Factors	Univariate F Values	Standardized Discriminant Weights
Played an instrument	5.83*	.80
Symphony concert attendance	.63	-
Number of rock concerts attended	4.43*	-.07
Number in family who play organ	.72	-
Number of country and western concerts attended	.56	-
Number of symphony concerts parents attended	.28	-
Sung/played in school performing group	.31	-

*Significant at the .05 level.

Group Centroids	
High music aptitude subjects	.48
Low music aptitude subjects	-.61

Based on the data, only two of the seven musical environmental factors proved to be a valid discriminator between the subjects who scored high or low on the MAP. Those subjects who scored high on the MAP were more likely to have played a musical instrument and attended fewer rock concerts than the low-scoring subjects. The other music environmental factors (i.e., symphony concert attendance, number in family who played organ, number of country and western concerts attended, number of symphony concerts subjects' parents attended, and sung or played in a school performing group) did not

prove to be valid discriminators.

Conclusions

What aspects of heredity, personality traits, socio-economic levels, maturational levels, or environmental influences are related to musical aptitude? Music teachers and researchers often ask why are some students more musical than others and wonder what factors differentiate the variety of levels of music aptitude within a group.

This study sought to determine what musical environmental factors are related to musical aptitude for eleven-year-old children. Based on the results, one of the seven selected musical environmental factors (i.e., playing an instrument) shows a statistically significant correlation with the rhythmic imagery "sub-test" of the MAP, a widely used instrument for evaluating music aptitude. However, this particular musical environmental factor, playing an instrument, is not significantly related to the tonal imagery or the musical sensitivity scores of the MAP. Additionally, none of the other musical environmental factors (i.e., symphony concert attendance, rock concert attendance, country and western concert attendance, school performing experience, subjects' parents concert attendance, and family members' musical involvement) is significantly related to scores on the MAP.

Interestingly, when comparing subjects who scored high and low on a music aptitude test on the seven musical environmental factors (see Table 4), there are significant differences between these two groups. Even though there are no direct relationships between (six of the seven) musical environmental factors and musical aptitude, two musical environmental factors do, however, prove to be valid discriminators between the high-and low-scoring subjects (see Table 5). These two musical environmental factors are "playing a musical instrument" and "attendance at rock concerts". The high-music-

aptitude-scoring subjects as compared to the low-music-aptitude-scoring subjects were more likely to have played a musical instrument and attended fewer rock concerts.

From a narrow perspective these findings may be disturbing to some. For example, parents and educators assume that a variety of rich musical experiences provided both in and outside of school contributes to a student's musical talent. Based on the results of this study, however, there is no apparent relationship (except for students who play instruments) between musical environment and musical aptitude for eleven-year-old children. Does this imply that parents and educators should stop attempting to provide an atmosphere in which children are permitted to participate in many musical experiences (4,55)? Of course not. This study only reflects on the difficulty that educators and parents may have in influencing an eleven-year old's musical aptitude, not musical skills, achievement, and interest.

The results of other studies reinforce the importance of music in the child's early life. From birth to age nine, parents and educators can expect to influence musical aptitude through providing a rich musical environment (3). The findings of this study are congruent with other studies which show that beyond age nine, the musical environment may enhance musical achievement and response, but not necessarily musical aptitude (7,20).

In terms of future research, it is recommended that cross-validation studies with different age subjects from diverse socio-economic backgrounds be completed. Other musical environmental factors should also be examined with regards to their relationship to musical aptitude. Further development of an instrument to evaluate musical environment with greater precision is additionally recommended.

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